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Nonpoint Source Pollution in the Flathead Basin

What is it?
Where does it come from?
What problems does it cause?
What can we do about it?

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The Freshwater Foundation is a non-profit organization which encourages proper use and management of our water resources to keep them usable for human consumption, industry and recreation. The Foundation supports scientific research into the problems confronting freshwater supplies and works to increase public awareness of freshwater issues.

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Snow may be Montana's most valuable natural resource—not because it brings skiers, but because it brings water. Montana's watersheds produce approximately 31 million acre-feet of water each year. That's about enough to cover the entire state to a depth of four inches. Melting snow is responsible for about 70 percent of the total—rainfall provides the rest.

This water doesn't drop from the sky *as pure as the driven snow*. It is contaminated with airborne pollutants that come from automobile exhausts, industrial smokestacks, power plants, wind erosion of soil and from other sources.

Some of the snow and rain that falls to earth evaporates and some of it seeps into the ground, recharging the groundwater. The remainder becomes runoff. Runoff—from either melted snow or rain—swells our streams, sustains our wetlands, fills our lakes and provides water for drinking, recreation and industry.

Runoff, however, carries with it eroded soil and pollutants that are picked up as the water crosses wheat fields, parking lots, pastures, highways and other surfaces. *The faster runoff moves over the ground, the more soil and other pollutants it washes loose and carries into rivers, lakes and groundwater. Pollution that enters water in this way is called nonpoint source pollution.*

When the job of cleaning up America's water resources first began, it was relatively easy to point the finger of blame at industries and municipalities. Their pollution came from the ends of pipes—the so-called point sources. Point sources were easy to identify and corrective regulations and actions, though expensive, were enforceable. It was when point sources were at last beginning to come under control that the importance of nonpoint source pollution became apparent, and the finger of blame was pointed again—this time it points at all of us.

How Severe is the Problem of Nonpoint Source Pollution in the Flathead Basin?

The Water Quality Bureau, Montana Department of Health and Environmental Sciences, estimates that 95 percent of all water pollution in Montana comes from nonpoint sources. In the Flathead Basin 75 percent of the total amount of phosphorus entering Flathead Lake comes from nonpoint sources, including overland runoff from developed and undeveloped land, natural and accelerated streambank erosion and recharge of surface water by groundwater. Yet, unlike many parts of the country, water quality in the Flathead Basin is still relatively unpolluted, so pollution control emphasis can be placed on prevention rather than correction. *Protecting the valuable water resources of the Basin from further pollution by nonpoint sources will be much easier and less expensive now than cleaning up contamination would be later.*



Unprotected soil is easily eroded.

Where Does Nonpoint Source Pollution Come From?

Agriculture

Erosion from cropland is a major source of sediment. Sediment alters stream and lake banks and bottoms. The eroded soil particles have pollutants, such as phosphorus and pesticides, attached to them. These pollutants are carried with the sediment into water bodies.

Pesticides and other agricultural chemicals can contaminate water when they are improperly applied, handled or stored. Urban use of these chemicals can also contaminate water, because they are applied in high concentrations to small areas by untrained applicators. Sometimes herbicides are used in lakes and streams to control weeds, algae and other aquatic nuisances.

Most fertilizers contain nitrogen, phosphate and potassium, nutrients that can, if they reach water bodies, lead to excessive growth of algae and other aquatic plants. If they seep into groundwater, these fertilizer components can contaminate drinking water supplies.

Pollution from feedlots occurs when runoff from a feedlot carries pollutants from improperly stored and handled manure into surface water and groundwater. This can lead to pollution of surface water by ammonia, by organic materials that deplete the supply of oxygen in the water, and by microorganisms that can cause disease. Groundwater can be polluted by nitrates or bacteria.

Improper use of pasture land exposes soil to erosion. Direct access of livestock to streams and lakes can cause pollution from animal wastes. Livestock can trample streambanks and shorelines, causing erosion; they can also destroy vegetation and degrade the habitat of fish and other aquatic life.

Urban Areas

In some areas of the country, urban snowmelt or stormwater runoff carries a volume of pollutants equal to, or greater than, the sanitary sewage system. Urban runoff can contain toxic materials such as heavy metals, nutrients, bacteria, suspended solids and oxygen-consuming organic materials. Urban runoff is also affected by factors such as population and traffic density, litter, fertilizer and pesticide use, airborne pollutants, construction, animal wastes, landfills or dumps, spilling or leaking of hazardous material and the application and storage of de-icing chemicals.

Construction

New construction for housing, industry, commerce, recreation or transportation contributes to water pollution from erosion and sedimentation and from the harmful chemicals and other materials found on construction sites. Sometimes sediment from construction fills ditches and storm sewers at great expense to taxpayers.

Dumps and Landfills

Dumps are at best unsanitary and unsightly. At worst they pollute both air and water. Landfills, when properly designed and located, reduce the potential for groundwater contamination. But many landfills are leaking into the groundwater, even those designed and constructed according to "state-of-the-art" information and technology at the time they opened.

Forestry and Mining

Mining operations can affect surrounding watersheds in significant ways: Sediment, tailings, dust and chemicals from open pits, strip and underground mines can all pollute lakes, streams and groundwater.

Forestry operations that can contribute to nonpoint source pollution include road construction, land clearing, skidding, yarding, stacking and loading operations, application of pesticides and site preparation for regeneration. Increased soil runoff, soil erosion and the introduction of organic materials and manmade chemicals into streams are the most commonly reported nonpoint pollution problems associated with forestry.

Other Sources

On-site septic systems—Improperly designed, sited, constructed or maintained domestic waste disposal systems can contaminate both groundwater and surface water with nitrates, phosphates and disease-causing organisms, threatening public health and degrading water quality. Nitrate and phosphate contamination can even occur from properly functioning systems.

Highway de-icing—Sand and mixtures of sand with salt or other chemicals are used to keep winter roadways open and safe; but when applied to roads, these chemicals can run off into water bodies causing water quality problems. Studies show that airborne dust, created when highway de-icing compounds dry, is a primary component of air pollution. Thorough cleaning of streets and roadways is essential.

Wetland destruction—Wetlands reduce flooding and trap sediment, nutrients and other pollutants. Converting wetlands to cropland or building sites eliminates those functions. Other concerns associated with wetland destruction include loss of wildlife habitat and reduced groundwater recharge.

What Problems Are Caused by Nonpoint Source Pollution?

Sedimentation

Sedimentation is a natural process that occurs when particles of silt, organic matter and other materials carried by the wind or flowing water are deposited on the bottom of a lake or river. When accelerated by erosion and runoff, sediment reduces the quality and value of lakes and streams. It reduces fish populations by decreasing food supply, altering habitat, interfering with reproduction and decreasing the supply of oxygen needed to support aquatic life. Large amounts of sediment interfere with swimming and boating and increase the cost of drinking water treatment. In some areas sediment reduces the storage capacity of lakes and reservoirs.

Nutrients

Excessive nutrients promote accelerated eutrophication or "aging" of lakes, a condition characterized by algal blooms and an over-abundance of other aquatic plants. Desirable aquatic vegetation, fish and other aquatic life are eventually choked out. Algal blooms are always unsightly and sometimes toxic to livestock and other animals. Recreational uses of lakes and streams are diminished by algal blooms and waterfront property values are lowered.

Nutrients also affect groundwater, reducing the supply of quality drinking water. Nitrates can cause a serious health problem (methemoglobinemia) in infants who drink formula prepared from nitrate-contaminated water.

Toxic Substances

Toxic chemicals can impact and even kill fish and other aquatic life in lakes and other surface waters by affecting reproduction, respiration, growth and development, and food supply. Toxic chemicals can accumulate in the tissues of fish and other organisms, creating a health hazard for those humans and other animals who eat them. Commercial and recreational fisheries lose value, and economies that count on tourism suffer.

Drinking water contaminated with some toxic chemicals may cause cancer, birth defects and other problems in humans and other species. Once contaminated with toxic chemicals, groundwater is very expensive, and often impossible, to clean up. Property values plummet in areas where the drinking water supply has been contaminated.

Disease-bearing Organisms

Fecal material can be carried into water by runoff from farmland, feedlots and urban areas. It can also seep into the groundwater from poorly maintained septic systems, dumps and landfills. To test water for fecal contamination, fecal coliform bacteria are measured. Though these bacteria are not themselves harmful, they indicate the possible presence of pathogens that can cause health problems such as cholera, dysentery and typhoid fever. Fecal pollution increases the treatment costs for drinking water and reduces the recreational value of lakes and streams.

Who is Responsible for Controlling Nonpoint Source Pollution?

It is difficult to single out nonpoint source polluters, because whether it happens in a town or on the farm, nonpoint source pollution is caused by ordinary people going about their everyday lives. Ultimately, control will depend on each of us changing our activities on land in order to protect our water resources.

A number of local, state and federal laws and programs deal either directly or indirectly with nonpoint pollution. For example, the Montana Natural Streambed and Land Preservation Act of 1975 (the "310" law) requires permits for stream alterations such as crossings, culverts and riprapping. The Abandoned Mine Lands Reclamation Program reduces the environmental impact of mining operations. Montana Floodplain and Floodwater Management Regulations address land uses in flood plains to protect public health and water quality. Other programs fight soil erosion, control pesticide use, clean up hazardous wastes, penalize polluters and deal with many other activities related to nonpoint source pollution.

The 1987 Water Quality Act added Section 319 to the federal Clean Water Act. The Act calls for each state to assess nonpoint source pollution and to prepare a program to manage nonpoint sources.

What Can We Do To Control Nonpoint Source Pollution?

Data Collection

Information about the physical nature and distribution of the Basin's soil and water resources must be gathered and analyzed. Information about economic and residential development, as well as projected future trends in these areas, is necessary for making wise management decisions.



Adequate information about the Basin's waters is essential.

Best Management Practices

Best management practices (BMPs) are techniques and procedures that prevent or reduce water pollution. BMPs include regulations, structures, operations procedures, and other measures. They can be used to control the availability of pollutants, to keep pollutants out of the runoff or to prevent pollutants from entering water bodies. Best management practices can be applied to almost any project—in the forest and home as well as on the farm.

In the City—Some of the best management practices that are used effectively in urban areas are erosion and runoff controls, such as the use of porous paving materials and grassy waterways, street sweeping to reduce the amount of litter, and detention ponds where sediment and other pollutants can settle. Community recycling and household hazardous waste collection programs are effective in conserving landfill space and preventing seepage of toxic chemicals into the groundwater.

Lakeshore and Streambank Homeowners—Homeowners who live near lakes, ponds, streams and wetlands can apply a variety of best management practices to protect surface water. Well-designed access roads, for example, reduce runoff and erosion—so do buffer strips of natural vegetation that also filter out nutrients. Septic systems must be regularly maintained and lawn and garden chemicals should be avoided in areas near surface water.

On the Farm—Best management practices on the farm include conservation tillage, irrigation scheduling, soil testing to determine fertilizer needs, timing of fertilizer application, strip cropping, buffer strips and manure management. Though each of these practices is called a best management practice, the BMP or combination of BMPs that is “best” for a particular agricultural operation must be determined by the nature of the operation and by balancing economic, environmental and other factors.

In the Forests and Mines—Among many best management practices applied to forestry and mining activities are minimizing the number of roads and stream crossings constructed, stabilizing soil on steep and exposed slopes, following directions and laws for the proper use and storage of potentially hazardous substances such as fuels, solvents and pesticides, and restoring disturbed areas when operations are completed.

Which Best Management Practices Are Really Best?

There is no such thing as the "best" best management practice. Each situation is different, depending on the hydrology, geology, soil types, land use, economics, regulations and customs of an area. Usually, a combination of BMPs will give the best results and often trade-offs must be made to achieve the best solution. Several BMPs that have proven their worth through the years are described below. There are, of course, many others. The resources listed on the last page can supply information and technical assistance for planning the best course of action for a particular situation.

Buffer Strips

Strips of vegetation, called buffers, help to filter runoff. They are often used along shorelines, streambanks and wetlands to protect surface water. These buffers can be either natural or planted vegetation. Though sometimes buffers are used for aesthetic purposes, such as to shield recreational areas from mining and forestry operations, their most important functions are to protect water quality by filtering sediment, nutrients and other pollutants from runoff, to prevent erosion and to provide wildlife and plant habitat. Several studies have shown that a forested buffer between farmland and stream can reduce by as much as 80 percent the amount of nitrogen entering the stream.

How wide should a buffer strip be? That depends on the water body being protected, the land activities from which it is being protected and the slope of the surrounding landscape. In Montana a streamside management zone of at least 25 feet on either side of a stream (plus extensions for wetlands and steep slopes) is recommended for commercial logging operations.

Soil Testing

Nitrogen fertilizers are commonly used to increase crop yield. However, there are several other sources of nitrogen available to crops: organic matter in the soil, residuals from past fertilizer applications, and crops such as alfalfa that have been used in rotation. These sources can add up to too much of a good thing. Soil should be tested each year before applying additional nitrogen fertilizer. It is not cost-effective to apply more fertilizer than plants can use, and the extra may leach into the groundwater.

Conservation Tillage

Farming practices that reduce the number of times the soil is cultivated and retain protective amounts of residual mulch on the surface are called conservation tillage. Farmers have had great success using these techniques, as well as crop rotation, strip-cropping on the contour, grassy waterways and other methods to reduce water runoff and soil erosion.

Wellhead Protection

A well shaft can act as a funnel, providing runoff direct access to groundwater. It is important that working wells be properly sited, constructed and maintained. The area around a well should be carefully managed to reduce pollutants available to runoff. For example, manure storage should be away from the well, and fertilizers and pesticides should not be applied near it. Unused wells must never be simply abandoned. These wells should be properly capped or sealed according to directions available from your local extension agent.

Integrated Pest Management

Both rural and urban gardeners can use integrated pest management to control the organisms that threaten their crops, while limiting the amount of chemicals available to be washed or leached into surface and groundwater. It involves consideration of such factors as: how much pesticide is enough; when is the best time to apply it; and how should it be applied, handled and stored. Other considerations are the use of pest-resistant crops, crop rotation, companion crops and biological controls.

Haul Roads and Skid Trails

One of the logging activities that has the greatest potential to degrade water quality is forest road construction. Before logging operations begin, care should be given to the location and design of haul roads and skid trails. Gradient, drainage, soil stabilization and filter strips should all be considered. Wherever possible bare soil exposed during the operation should be covered to control erosion. When not in use, these roads should be closed and seeded; and revegetation should be encouraged for natural erosion control as soon as possible.

Controlling Nonpoint Pollution in the Flathead Basin is Up to Each of us

Nonpoint source pollution is widespread and diverse. The job of controlling it is immense, but it is "doable". All we have to do is think before we act and ask ourselves if what we are about to do will endanger our water. Do you really need the greenest lawn on the block? Is there a better place than that ditch out in back to dump used motor oil? *Whether we are running a business, a city or a family, cleaning up our act on land is the only way to clean up the water. Each of us must assume responsibility for our water resources.*

For Further Information About Controlling Nonpoint Source Pollution:

Home and Garden/Farm and Ranch

- County Extension Offices
- Conservation Districts
- USDA Soil Conservation Service
- USDA Agricultural Stabilization and Conservation Services

Shoreline and Streambed

- County Planning Offices
- Confederated Salish and Kootenai Tribes, Shoreline Protection Office
- Conservation Districts
- U.S. Army Corps of Engineers

Forest Lands

- Conservation Districts
- Confederated Salish and Kootenai Tribes, Forest Office
- Montana Department of State Lands
- Montana State University Cooperative Extension Service
- USDA Forest Service
- USDI Bureau of Land Management

General Information

- Water Quality Bureau, Montana Department of Health and Environmental Sciences
- U.S. Environmental Protection Agency
- Flathead Basin Commission
- Freshwater Foundation

The Flathead Basin Commission

The Flathead Basin Commission was established by the 1983 Montana Legislature to protect the quality of Flathead Lake's aquatic environment, waters that flow into or out of the lake, and other natural resources of the Basin.

The Commission is made up of representatives of federal, state, local and Canadian agencies, as well as tribal, private and citizen interests. The Commission is charged with the following tasks:

- Monitoring the Basin's natural resources;
- Encouraging cooperation among Basin land managers;
- Holding public hearings on the condition of the Basin;
- Supporting economic development without compromising the Basin's aquatic system;
- Promoting cooperation between Montana and British Columbia on resource development in the Flathead Basin;
- Making recommendations to the Legislature regarding the preservation of the Basin's aquatic resources.

For more information on the Flathead Basin Commission or for additional copies of this brochure, contact:

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